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ABSTRACT

This document outlines the aerospace-aviation education program of the State of Texas. In this publication the course structures have been revised to fit the quarter system format of secondary schools in Texas. The four courses outlined here have been designed for students who will be consumers of aerospace products, spinoffs, and services or who may find careers in the aerospace industry. After a brief introduction, philosophy statement including rationale, and a list of qualifications for aerospace-aviation teachers, the course descriptions are given. The first two courses, Aerospace-Aviation Education I and II are interdisciplinary courses which introduce interested high school students to the history and basic scientific and technological fundamentals of flight. Aerospace-Aviation Education III provides students with an advanced technological orientation and may include a flight training program. Aerospace-Aviation Education IV is the most advanced course of the series. Flight Laboratory Options are outlined for III and IV. Appended are lists of possible teaching aids, field trips, classroom activities and information sources. (MR)

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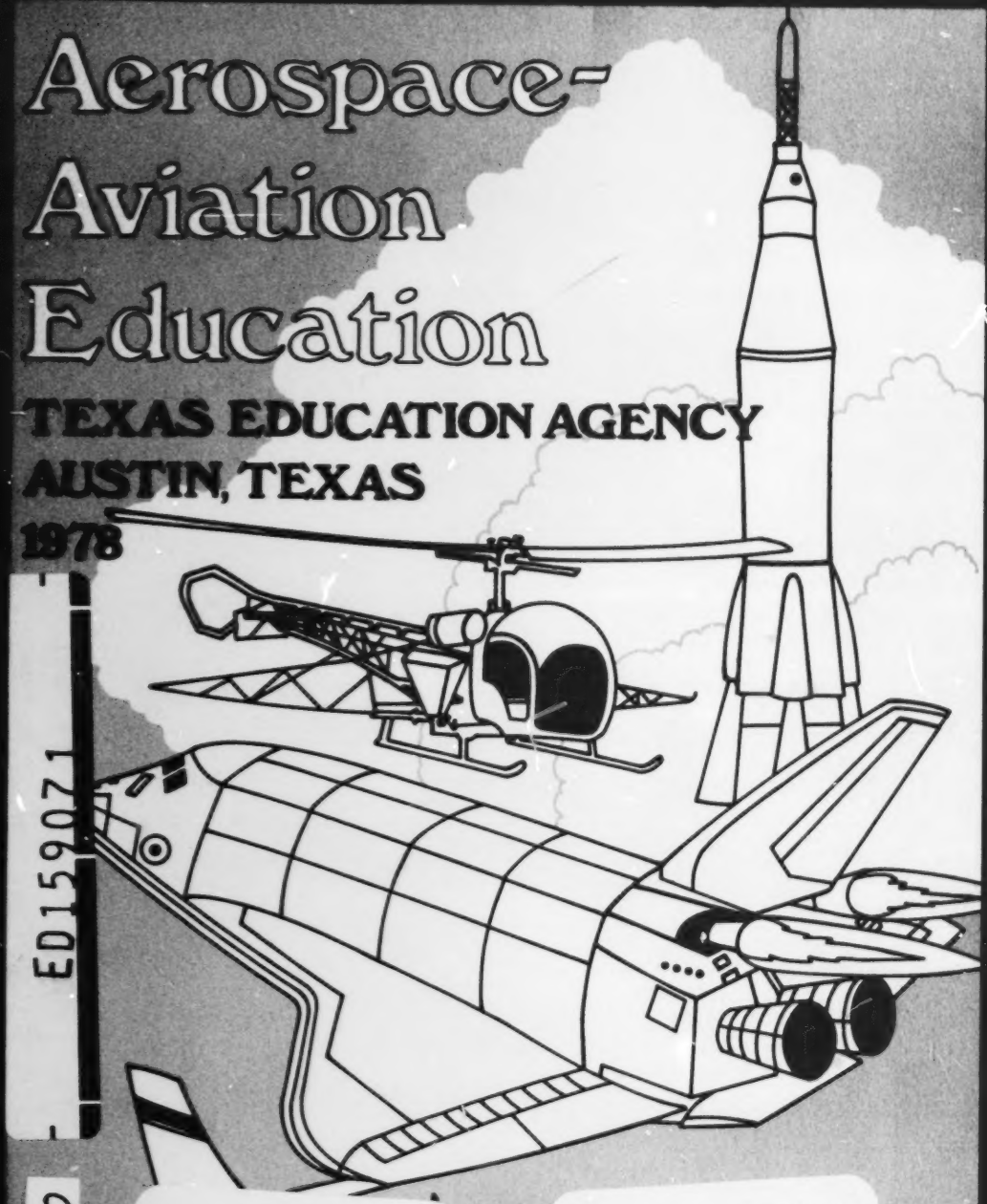
Aerospace-Aviation Education

TEXAS EDUCATION AGENCY
AUSTIN, TEXAS
1978



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Aerospace-Aviation Education

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FOREWORD

Aerospace-Aviation Education is a revision of the original Texas Education Agency Bulletin 712 which was printed in 1971. This edition has been prepared to assist Texas secondary school administrators and teachers of aerospace-aviation education in planning, developing, and implementing aerospace-aviation courses in the quarter system format.

A committee of public school teachers of aerospace-aviation education, school administrators, and representatives from the Texas Advisory Council on Aerospace-Aviation Education contributed to the development of *Aerospace-Aviation Education*. The purpose was to establish a framework for teachers to use in assisting students to learn aerospace-aviation concepts and skills. The material is not designed to make each student an aeronautical engineer or a pilot, but to enable students to become better space age citizens.

We hope that this publication will encourage interest in school activities pertaining to aerospace-aviation and will facilitate implementation of aerospace-aviation education courses in the secondary curriculum.

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- Teachers and administrators in whose schools Aerospace-Aviation courses are being taught

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INTRODUCTION

Aerospace-Aviation Education presents outlines of six secondary school courses and a description of the qualifications needed to teach aerospace-aviation in Texas.

Recommendations related to both the course outlines and teacher qualifications were first developed by a committee of the forerunner of the present Texas Advisory Council on Aerospace-Aviation Education. The original organization, the Texas Aerospace Education Council, had been created in 1968 and was reorganized in 1976 to conform to State Board of Education policies for advisory committees. The recommendations, approved by the State Board of Education, were reflected in Texas Education Agency Bulletin 712 published in 1971, of which this publication is a revision.

In this publication, the course structures have been modified to conform to the quarter system format. Aerospace-Aviation I, formerly designated as a one-semester offering, can now be offered in either one or two quarters. Aerospace-Aviation II is designed to be offered in two quarters. Aerospace-Aviation III and IV of the former semester structure have been redesignated as III, IVA, and IVB under the quarter system format with each valued at one quarter. Basic course content remains essentially unchanged.

The courses outlined have been developed primarily for students who will be the future consumers of aerospace products, spinoffs, and services or who may find careers in aerospace.

By no means should the topics listed be considered the only ones that may be taught. Constant progress in the aerospace field necessitates periodic revision and inclusion of updated activities.

The course outlines are part of general education, although courses III, IVA, and IVB do narrow somewhat toward specialization. Should the student wish to enter a vocational aerospace course, these general courses will help him or her develop a valuable background for it.

These courses are listed as electives in *Principles, Standards, and Procedures for The Accreditation of School Districts*, Texas Education Agency publication AD7 825 01.

PHILOSOPHY

Aerospace-aviation education is a course of study using one or a combination of four basic approaches:

GENERAL AEROSPACE EDUCATION – In this context, aerospace-aviation is taught as a separate course of study. The objective is for students to develop knowledge, skills, and attitudes about aerospace activities and to become aware of the total impact of the air and space age upon our society so that they may understand the importance of aerospace technology, regardless of their chosen occupations. Aerospace-Aviation Education I, IIA, and IIB fit this category.

MULTIDISCIPLINARY APPROACH – Instead of a separate aerospace-aviation course, this approach seeks to integrate aerospace-aviation study units into existing traditional course offerings, such as science, mathematics, and social studies. Because of their fascination for many students, the airplane and space vehicle are significant "teaching tools" the teacher can use to help students develop fundamental concepts common to aerospace-aviation as well as to other subject areas of the traditional curriculum. Topics included in aerospace-aviation education courses have a relationship with existing traditional curricular offerings. The prime advantage of the interdisciplinary approach is that students can see direct applications for concepts, skills, and knowledge. Thus, aerospace-aviation education is a natural motivator in many students.

CAREER EDUCATION APPLICATION – In aerospace-aviation careers, secondary education is seldom considered to be the terminal career preparatory level. Rather it is largely investigative, exploratory, and capable of providing students with a "preview" and foundation of skills, knowledge, and attitudes upon which to base determination about future educational pursuits in more defined, specific career areas.

OCCUPATIONAL EDUCATION AND TECHNOLOGY APPROACH – Some secondary schools have introduced aerospace-aviation related courses which concentrate on a vocational-technical approach. In one such course, students actually construct an airplane. Many students in these courses will terminate their formal education at the secondary level, and the occupational skills attained here will provide entry level preparation for earning a living in the aerospace-aviation industry.

TEXAS TEACHER QUALIFICATIONS FOR AEROSPACE-AVIATION EDUCATION

To teach Aerospace-Aviation I, IIA, and IIB, a teacher must hold a valid Texas Secondary Certificate and comply with any **one** of the following:

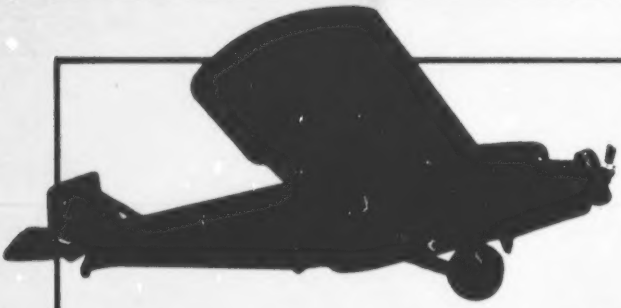
- Possess a valid Federal Aviation Administration Private Pilot Certificate (or higher)
- Possess a valid Federal Aviation Administration Basic Ground School Instructor Certificate (or higher)
- Have earned six semester hours in an aerospace-aviation course or workshop or equivalent courses in space sciences, such as meteorology and aero-dynamics of flight

To teach Aerospace-Aviation III, IVA, and IVB, a teacher must hold a valid Texas Teaching Certificate and comply with any **one** of the following:

- Possess a valid Federal Aviation Administration Flight Instructor (or higher)
- Possess a valid Federal Aviation Administration Flight Instructor Certificate (or higher)
- Have earned six semester hours in an aerospace-aviation course or workshop and have verified actual operational experience in:
  - air traffic control

    or
  - aircraft operation as a required flight crew member

NOTE: Texas teacher standards for secondary aerospace-aviation are established under "accreditation" rather than under "certification;" therefore, teaching certificates will not reflect an additional subject area endorsement.



Aerospace-Aviation Education I

Grade Placement: 10-12
Prerequisite: None
Credit: One quarter

Aerospace-Aviation Education I is designed to provide the student with a fundamental insight into the concepts underlying the cultural and technological impact of the aerospace age. By utilizing the airplane and the space vehicle as contemporary teaching tools, a high level of student interest can be maintained.

Aerospace-Aviation Education I is intended to develop within the student an understanding of the relationships of man and the aerospace age from a cultural-sociological standpoint and simultaneously to bring into focus the scientific and technological facets that serve as the foundation on which the aerospace age is founded.

The following topic outline is a guide for secondary teachers; however, the method and order in which topics are presented is left to the discretion of individual teachers.

AEROSPACE-AVIATION EDUCATION I
TOPIC OUTLINE

Introduction to Aerospace

Early attempts to fly—mythology and folklore
Aviation—Leonardo da Vinci to the Wright brothers

Aerospace—The Wright brothers to Apollo

The manufacturing and air transport industry

- Airmail Act of 1925
- Federal supervision
- Military Airlift Command (MAC)
- Subsidies and payment for service of airlines
- American aircraft and aircraft parts manufacturers
- American airlines, current and extinct

General and military aviation

- Uses of general aviation
- Types and purposes of military aircraft

Social, Political, Economic, and Cultural Spectrum of Aerospace

The cultural impact of the aerospace age

- Population distribution
- International relations

Military aerospace counterforce capabilities

- National Security Act of 1947
- Military aerospace power

Airport growth and development

The aerospace industry

- Manpower requirements
- Industrial and national survival

Research and development

- Complexities and capabilities of aerospace vehicles
- Speeds
- Power
- Precision instrumentation

Government in aerospace development

- National airport program
- Federal aid
- National Aeronautics and Space Administration (NASA)
- Office of Aerospace Research
- Space medicine
- Legal difficulties in space exploration

Rocket and Missile Fundamentals

The nature of outer space
Airframe systems
- Aerodynamic missile
- Ballistic missile

Propulsion systems
- Chemical rocket propulsion systems
- Gas-heating systems
- Ions
- Photons

Guidance-control systems
- Essential characteristics
- Short range
- Flight phases
- Basic requirements of automatic control system

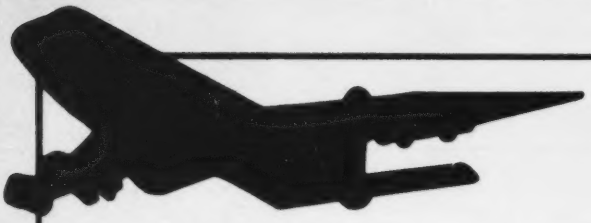
Payload
U.S. rocket and missile program
- Air-to-air
- Air-to-surface
- Surface-to-air
- Surface-to-surface
- Surface-to-underwater
- Diversionary
- Antimissile
- Ground equipment

Spacecraft operation

Physiology of Flight and Space Travel

Aerospace Age Career Guidance and Counseling

Air transportation
General aviation
Military
National Aeronautics and Space Administration (NASA)
Federal Aviation Administration (FAA)
Aerospace manufacturing



Aerospace-Aviation Education IIA and IIB

Grade Placement: 10-12
Prerequisite: None
Credit: Two quarters

Students who have a definite interest in the aeronautical aspect of aerospace activities may wish to take Aerospace-Aviation II. This course is intended to develop in the student a basic understanding of the scientific and technological fundamentals involved in flight. While utilizing the airplane as the tool of classroom instruction, the teacher can also present earth, physical, and biological sciences as they relate to the aerospace age. The course offers a good opportunity for interdisciplinary learning opportunities.

Aerospace-Aviation Education II is designed to encompass the equivalent of a Federal Aviation Administration private pilot ground school and should prepare the student to take the FAA private pilot written examination if the instructor elects to incorporate it. The program may include demonstrations, student experimentation, field studies, and long-term projects in addition to regular classroom instruction.

Since Aerospace-Aviation Education II requires two quarters for completion, the following topical outline is divided into two quarters, IIA and IIB, however, the quarters should be offered so that students complete both of them consecutively. However, the method and order in which topics are presented is left to the discretion of individual teachers.

Basic Aerodynamics and Pre-Flight Facts

Atmospheric science
Theories of flight
- Daniel Bernoulli's law (18th century)
- Newton's three laws of motion, action, and reaction
- Universal gas laws
- Laminar and turbulent flow

Aerodynamics of lift, thrust, gravity, and drag lift
Velocity characteristics
Load factors – mathematics of weight and balance
- Maximum gross weight
- Load placements
- Center of gravity
- Effects of maneuvers
- Stresses

Power Plants, Instruments, Systems

Simple machines and energy conversion
Internal combustion reciprocating engine
- Four-stroke cycle
- Fuel systems
- Supercharger to assist carburetor
- Fuel injection

Turbo and ramjet engines
Fuel, ignition, lubrication, cooling, electrical, and hydraulic systems
Instrumentation and interpretation – gyroscopic applications
- Common engine instruments
- Navigation instruments
- Flight instruments

Aeronautical Meteorology

The atmosphere – stability and instability
Temperature, pressure, and moisture factors
Clouds and fog
Air masses and frontal weather
Wind
Thunderstorms
Turbulence
Prognosis and reports interpretation

Flight Computer Functions

Centigrade and Fahrenheit – nautical-statute conversions
Time-speed-distance-fuel computations
Temperature-pressure-speed computations
Wind vector-drift-heading-speed determinations

Basic Navigation

The earth's surface and coordinates
- Meridians of longitude, parallels of latitude
- The problem of time

Azimuth, direction, and distance
Map and chart interpretation
- Map projections
- Chart interpretation
- Scale

Time belts – Greenwich standardization
Pilotage
Dead reckoning
Celestial (DR)
Inertial

Radio Navigation

Very high frequency omnidirectional range stations (VOR)
Automatic direction finding (ADF)
Instrument landing system (ILS)
Radar services

Air Traffic Control, Communications Federal Aviation Regulations

Charting of airports and airways
Air traffic control facilities
Air traffic patterns
Communications
Federal Aviation Regulations (FAR)
Flight information publications
Emergency procedures

Introduction to Flight Maneuvers

Turns
Climbs
Stalls
Takeoffs and landings

Federal Aviation Administration Private Pilot Written Examination

(optional)

Alternate Approaches for Teaching Aerospace-Aviation Education III and IV

ALTERNATE APPROACHES FOR TEACHING AEROSPACE-AVIATION EDUCATION III AND IV

Many high school administrators have found that a single or limited course offering in a particular subject is frequently inadequate to fulfill student needs and that an advanced or continuing program is justified. This is especially true in the case of high-interest programs such as aerospace-aviation education if the student has nowhere to go after completing the basic or first-year offerings.

The State Board of Education has made provisions for a continuing program in aerospace-aviation education by approving three advanced (second-year) quarter offerings. Significant options permit local school districts flexibility commensurate with local needs and desires.

Basically, there are three options:

Option I – Academic Classroom Approach: Aerospace-Aviation III, IVA, and IVB provide for study without actual dual flight instruction.

Option II – Flight Laboratory Approach: Aerospace-Aviation Education III, IVA, and IVB are presented as a practical laboratory application of the concepts embodied in Aerospace-Aviation Education IIA and IIB (ground school) and consist of regular dual and solo flight instruction leading to solo flight achievement and the award of the Federal Aviation Administration Private Pilot Certificate.

Option III – Combination Academic Classroom and Laboratory Approach

In instances where Option II, Flight Laboratory, is chosen, certain requirements are mandatory to comply with Federal Aviation Administration regulations.

- Prior to solo, the student must complete an FAA third-class physical examination (or higher) administered by a physican designated by FAA. The completed medical certificate is also the student pilot license. This combination medical certificate and student license will be issued after the student has reached his or her 16th birthday.

- To successfully complete Aerospace-Aviation Education IVB, the student must have reached his or her 17th birthday to be eligible for issuance of an FAA Private Pilot Certificate.

Two approaches are suggested for handling the flight laboratory when it is incorporated in Aerospace-Aviation Education III, IVA, or IVB.

- Independent laboratory performance by the student may be required either during specified school hours or outside regular school time. In this arrangement, the student schedules flight training on his or her own at the local airport with a qualified, government-certified flight instructor, attaining predetermined levels of achievement and proficiency according to a time-table established by the instructor. The arrangement could be similar to educational performance contracting, which is being used in other areas of the curriculum. It would necessitate close liaison between teacher and flight instructor. Unless other funds are available, the costs of such a training would be provided by the student on a laboratory basis.

- Flight training may be provided at a local airport through a contractual arrangement between the school district and the airport flight school operator. Financing of training might still be the responsibility of either school or student; however, the contractual agreement could serve to reduce overall flight training costs under predetermined rates.

In any event, the school electing a flight laboratory option will want to:

- obtain parental permission specifying liability release, and;

- assure adequate insurance coverage of the student by the airport flight school operator.

Aerospace-Aviation Education III

Grade Placement: 11-12
Prerequisite: Aerospace-Aviation Education II
Credit: One quarter

The content of Aerospace-Aviation Education III should be a natural outgrowth and progression from that of Aerospace-Aviation Education II. It is designed for students who have a significant interest in activities related to aviation and aerospace and who, after the successful completion of an earlier course, desire to study aviation further. It should provide students with an advanced technological orientation as well as a solid foundation on which to build an aerospace-aviation career.

Aerospace-Aviation Education III may include an advanced academic program in the classroom, a flight training program through solo flight, or a combination of the two. A feasible combination would be an integration of the advanced academic classroom presentation with a flight training laboratory which would include approximately 10 to 12 hours of dual flight instruction culminating in solo flight experience.

If the flight training program is included, additional prerequisites – being 16 years of age and holding an FAA student pilot license – are required under Federal Aviation Administration regulations for solo flight.

ACADEMIC CLASSROOM OPTION

The following topics may be included in an academic classroom program. However, the method, order, and scope of topic presentation are left to the discretion of teachers and local school curriculum planners.

Directed Research Studies in the Socioeconomic Implications of Aerospace-Aviation Progression in Our World
Directed Research Studies in a Student- and Instructor-Selected Technical Area of Aerospace-Aviation Activities
Aerodynamics Theory and Analysis
Instruments, Systems, and Flight Relationships
Weight and Balance Computations
Studies in Aeronautical Meteorology
Flight Computer Computations
Problems in Air Navigation Science
Introduction to Commercial Flight Regulations
Primary Flight Maneuvers Analysis
Flight Safety Indoctrination

FLIGHT LABORATORY OPTION

The following components constitute the pre-solo flight training syllabus and incorporate the techniques of explanation, discussion, demonstration, student performance, review, and evaluation until an established satisfactory level of performance is achieved. FAA Advisory Circular 61-2, *Private Pilot Flight Training Guide*, is recommended for sequential training guidance.

Airplane Familiarization and Inspection
Starting the Engine
Radio Procedures
Taxiing
Pre-Takeoff Check
Takeoff
Traffic Pattern
Climbout
Climbing Turns
Straight and Level
Medium Turns
Slow Flight
Power-Off Stalls
Steep Turns
Confidence Maneuvers
Descents and Gliding Turns
Approach and Landing
Level off from Climbs and Glides
Coordination Exercises
Speed Changes in Level Flight

Glides and Gliding Turns
Turns to Headings
Ground Reference Maneuvers
Forced Landings
Emergency Procedures
Accelerated Stalls
Crosswind Takeoffs and Landings
Slips
Use of Flaps
Balked Takeoffs
Emergency Go-Arounds
Turns about a Point
Cross-Control Stalls
Maximum Performance Takeoff

With satisfactory performance and instructor approval, the student should be ready for his or her first solo flight at the end of Aerospace-Aviation Education III laboratory.

Aerospace-Aviation Education IVA and IVB

Grade Placement: 11-12
Prerequisite: Aerospace-Aviation Education III
Credit: Two quarters

The content of Aerospace-Aviation Education IVA and IVB is a continuation and extension of that of Aerospace-Aviation Education III. It is designed for those students who have successfully completed Aerospace-Aviation Education III and who desire an advanced technological orientation in aeronautics as well as a solid foundation for entering aerospace-aviation careers.

Aerospace-Aviation Education IVA and IVB may include an advanced academic program in the classroom, a flight training program culminating in completion of the solo cross-country flight, or a combination of the two. A feasible combination would be an integration of the advanced academic classroom presentation with a flight training laboratory which would include approximately eight to 12 hours of advanced dual instruction (in addition to the 12 hours of dual flight instruction received under Aerospace-Aviation Education III) and approximately 10-20 hours of supervised solo flight instruction.

Since Aerospace-Aviation Education IV requires two quarters for completion, the following topical outline is divided into two quarters – IVA and IVB.

AEROSPACE-AVIATION EDUCATION IVA QUARTER

Academic Classroom Option

The method, order, and scope of topic presentation are left to the discretion of teachers and local school curriculum planners.

Advanced Directed Research Studies in the Socioeconomic Implications of Aerospace-Aviation Progression in Our World
Advanced Directed Research Studies in a Student- and Instructor-Selected Technical Area of Aerospace-Aviation Activities
Aircraft Electronic Communications
Advanced Problems in Electronic Navigation
Advanced Physiological Aspects of Flight
- Low Altitude Physiology
- High Altitude (Space) Physiology

Introduction to Instrument Flight Techniques
Introduction to Instrument Regulations
Advanced Studies in Aeronautical Meteorology
Intermediate Flight Maneuvers Analysis
Advanced Flight Safety Indoctrination

Flight Laboratory Option

The following components constitute the post-solo flight training syllabus and incorporate the techniques of explanation, discussion, demonstration, student performance, review, and evaluation until an established satisfactory level of performance is achieved. FAA Advisory Circular 61-2, *Private Pilot Flight Training Guide*, is recommended for sequential training guidance.

Review of Pre-Solo Manuevers
Maximum Performance Takeoffs and Climbs
Precision Turns
Recovery from Unusual Attitudes
Precision Approaches
Use of Magnetic Compass
Stalls from Critical Flight Situations
Cross-Country Flying
Cross-Country Emergencies
Unfamiliar Airport Procedure
Use of Radio for Communications En Route
Tracking to and from a VOR Station
Visual Flight Rules Navigation
Lost Procedures
Simulated Adverse Weather Encounters
Short Field Takeoffs and Landings
Soft Field Takeoffs & Landings
180 degree and 360 degree Gliding Approaches

Obtaining Assistance by Radio
Filing of Flight Plans
Night Flight Familiarization
Airplane Servicing
Medium Turns to Headings
720 degree Turns about a Point
Air Speed Control Maneuvers
Maximum Performance Climbs
Pilotage and Map Reading
Time, Speed, and Distance Computations
Plotting VOR Cross Bearings
Plotting Alternate Courses in Flight
Private Pilot Flight Test Manuevers & Procedures

AEROSPACE-AVIATION EDUCATION IVB QUARTER

The content of Aerospace-Aviation Education IVB is a continuation and extension of that of Aerospace-Aviation Education IVA. It is designed for those students who have successfully completed Aerospace-Aviation Education IVA and who desire an advanced technological orientation in aeronautics as well as a solid foundation for entering aerospace-aviation careers. Aerospace-Aviation IVA must precede IVB.

Aerospace-Aviation Education IVB may include an advanced academic program in the classroom, a flight training program culminating in the award of a private pilot license or a combination of the two. A feasible combination would be an integration of the advanced academic classroom presentation with a flight training laboratory which includes approximately eight hours of advanced dual instruction (in addition to the 12 hours of dual flight instruction received under Aerospace-Aviation Education III) and approximately 20 hours of supervised solo flight instruction.

If a flight training program is incorporated, additional prerequisites – holding a Federal Aviation Administration third-class medical certificate and being 17 years of age – are required for the issuance of a private pilot license under Federal Aviation Administration regulations.

Academic Classroom Option

The method, order, and scope of topic presentation are left to the discretion of teachers and local school curriculum planners.

Advanced Directed Research Studies in the Socioeconomic Implications of Aerospace-Aviation Progression in Our World
Advanced Directed Research Studies in a Student- and Instructor-Selected Technical Area of Aerospace-Aviation Activities

Aircraft Electronic Communications
Advanced Problems in Electronic Navigation
Advanced Physiological Aspects of Flight
- Low Altitude Physiology
- High Altitude (Space) Physiology

Introduction to Instrument Flight Techniques
Introduction to Instrument Regulations
Advanced Studies in Aeronautical Meteorology
Intermediate Flight Maneuvers Analysis
Advanced Flight Safety Indoctrination

Flight Laboratory Option

The following components constitute the post-solo flight training syllabus and incorporate the techniques of explanation, discussion, demonstration, student performance, review, and evaluation until an established satisfactory level of performance is achieved. FAA Advisory Circular 61-2, *Private Pilot Flight Training Guide*, is recommended for sequential training guidance.

Review of Pre-Solo Maneuvers
Maximum Performance Takeoffs and Climbs
Precision Turns
Recovery from Unusual Attitudes
Precision Approches
Use of Magnetic Compass
Stalls from Critical Flight Situations
Cross-Country Flying
Cross-Country Emergencies
Unfamiliar Airport Procedure
Use of Radio for Communications En Route
Tracking to and from a VOR Station
Visual Flight Rules Navigation
Procedures to Follow When Lost
Simulated Adverse Weather Encounters
Short Field Takeoffs and Landings
Soft Field Takeoffs and Landings
180 degree and 360 degree Gliding Approaches
Obtaining Assistance by Radio
Filing of Flight Plans
Night Flight Familiarization
Airplane Servicing
Medium Turns to Headings
720 degree turns about a Point
Air Speed Control Maneuvers
Maximum Performance Climbs
Pilotage and Map Reading
Time, Speed, and Distance Computations
Plotting VOR Cross Bearings
Plotting Alternate Courses in Flight
Private Pilot Flight Test Maneuvers & Procedures

Exhibiting a satisfactory level of performance and meeting all other requirements, the student at the conclusion of Aerospace-Aviation Education IVB should be prepared to take the FAA private pilot flight test.

Appendix

CLASSROOM ACTIVITIES AND FIELD TRIPS

The possibilities for classroom activities and field trips related to aerospace-aviation are abundant. The following suggestions perhaps will provide a stimulus for teachers to find other appropriate experiences in the local area, keeping in mind available time and funds. Activities and field trips will be most effective, of course, when they are pertinent to the topic of current study.

CLASSROOM ACTIVITIES

Construction of paper sail planes
- Standard design
- Experimental designs
- Competition flying

Construction of model rockets
- Basic model
- Advanced models
- Experimental models
- Model rocket club competitior

Construction of model airplanes
- Solid models built to scale
- Flying models
  - Free flight
  - Control line flight
  - Radio control, single and three-way

Construction of a wind tunnel

Weather logging, plotting situation maps and forecast maps

Radio communications with walkie-talkie radios
Air-navigation game
Orientation flights
Link briefing and demonstration flight

FIELD TRIPS

Airport
- Briefing by manager
- Control Tower
- Weather Bureau
- Airline(s)
  - Office, ticket counter, baggage, freight, maintenance, kitchens
  - Passenger processing, from reservation by telephone to arrival at destination
- Communications center
- Aircraft parking
- Terminal
- Air mail area
- Auto parking area

Airline stewardess school
National Aeronautics and Space Administration (NASA) installations
General aviation installations
- Commercial, large or small fixed base operations
- Private

Aerospace industries
- Aircraft and accessories
- Rockets and missiles
- Research and development

Museums
Military air bases and other installations
- Research and development
- Training center

Planetariums
Observatories
Local Chapters of Experimental Aircraft Association

SOURCES OF FILMS AND FILMSTRIPS

The Boeing Company
Film Editor–News Bureau
P.O. Box 3707–M.S. 1641
Seattle, Washington 98124

Cessna Aircraft Company
Attention: Director, Public Relations
P.O. Box 1521
Wichita, Kansas 67201

Federal Aviation Administration
Film Library AC-921
Aeronautical Center
P.O. Box 25082
Oklahoma City, Oklahoma 73125

General Motors
Film Library
3044 West Grand Boulevard
Detroit, Michigan 48202

Jeppesen Sanderson, Inc.
8025 E. 40th Ave
Denver, Colorado 80207

National Aerospace Education Council
806 15th Street, N.W., Suite 310
Washington, D.C. 20005

NASA Manned Spacecraft Center
Photographic Technical Lab
AV Branch
Code BL-6
Houston, Texas 77085

Piper Aircraft Corporation
Lock Haven, Pennsylvania 17745
Attention: Air Science Education Department

REA Express Company
219 East 42nd Street
New York, New York 10017

Shell Oil Company
1 Shell Plaza
Houston, Texas 77002

USAF Central Audio Visual Library
Audio Visual Center
Norton Air Force Base
San Bernardino, California 92409

EXAM-O-GRAMS

The Federal Aviation Administration publishes *Exam-O-Grams* solely as an information service to individuals interested in Airman Written Examinations. These provide an excellent source of supplemental material and are available without charge. It is recommended that instructors ordering *Exam-O-Grams* request complete sets of Visual Flight Rules and Instrument Flight Rules and also ask to be placed on the mailing list for additional *Exam-O-Grams* as they become available.

Exam-O-Grams may be ordered from:

Exam-O-Grams
FAA Aeronautical Center
Flight Standards Technical Division
Operations Branch
P.O. Box 25082
Oklahoma City, OK 73125

ADVISORY CIRCULARS

In order to determine the price (some are free) and status of various FAA advisory circulars and the status of Federal Aviation Regulations, request the following publication:

AC 00 – 2Q
Advisory Circular Checklist and Status of FARs

From:
Department of Transportation
Distribution Unit TAD 484-3
Washington, DC 20590

AIRMAN'S INFORMATION MANUAL

Parts 1, 2, 3, 3A, and 4 of the Airman's Information Manual cost $45.50 per year on a subscription basis and may be ordered from:

National Oceanic and Atmospheric
Publications Section AD-143
Rockville, MD 20852

All course instructors should have at least one copy for each section.

DAILY WEATHER MAPS

A year's subscription to a weekly series of daily weather maps cost $7.50. Single copies of an explanation sheet are available free.

Order from:

National Oceanic and Atmospheric Publications
Section AD-143
Rockville, MD 20852

FAA PUBLICATIONS

Examination Guides are available for the various written and flight tests required for each pilot rating.

FAA Regulations Parts 1, 61, 91 (order Volumes I, VI, and IX)

Flight Training Handbook (AC 61-21)

Instrument Flying Handbook (AC 61-27B)

Order from:

Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402

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AIRCRAFT OWNER'S MANUALS

Having quantities of aircraft owner's manuals in the classroom can be an asset to instruction. Although aircraft owner's manuals can be purchased directly from the manufacturers, they perfer that you contact the local dealer. If a flight experience is being conducted, you might arrange for the fixed-base operator to include in the cost of the flight experience a copy of the owner's manual for the aircraft which will be used. Local aircraft dealers may give a discount on orders of large quantities of manuals.

SOURCES OF AEROSPACE BOOKS AND OTHER MATERIALS

Abelard-Schuman Limited
10 East 53rd Street
New York, NY 10022

Adler Planetarium
1300 S. Lake Shore Drive
Chicago, IL 60605

American Astronautical Society
P.O. Box 28130
San Diego, CA 92128

American Institute of
Aeronautics and Astronautics
1290 Avenue of the Americas
New York, NY 10019

American Meteorite Laboratory
P.O. Box 2098
Denver, CO 80201

Associated Press, Newsfeature Dept.
50 Rockefeller Plaza
New York, NY 10020

Bell System
Request from the Education
Representative of your nearest
major Bell Telephone Company office

Civil Air Patrol
National Headquarters
Maxwell Air Force Base
Maxwell Air Force Base, AL 36112

Thomas Y. Crowell Company
10 E. 53rd Street
New York, NY 10022

Dial Press, Inc.
Dag Hammarskjold Plaza
245 E. 47th Street
New York, NY 10017

Doubleday and Company, Inc.
245 Park Avenue
New York, NY 10017

General Electric Company
Space Division
Product Information
King of Prussia, PA 19406

Grosset and Dunlap, Inc.
51 Madison Avenue
New York, NY 10010

Hammond, Inc.
515 Valley Street
Maplewood, NJ 07040

Harper and Row Publishers, Inc.
10 E. 53rd Street
New York, NY 10022

Harvard University Press
79 Garden Street
Cambridge, MA 02138

Holiday House, Inc.
18 East 53rd Street
New York, NY 10022

Holt, Rinehart and Winston, Inc.
383 Madison Avenue
New York, NY 10017

Honeywell, Inc.
Aerospace Division
Mail Station G2118
Honeywell Plaza at 27th Street
Minneapolis, MN 55408

Jeppesen Sanderson, Inc.
8025 E. 40th Ave
Denver, Colorado 80207

Jet Propulsion Laboratory
Public Educational Services
4800 Oak Grove Drive
Pasadena, CA 91103

Macmillan Publishing Co., Inc.
866 Third Avenue
New York, NY 10022

McGraw-Hill Book Company
1221 Avenue of the Americas
New York, NY 10036

David McKay Company, Inc.
750 Third Avenue
New York, NY 10017

William Morrow and Company, Inc.
105 Madison Avenue
New York, NY 10016

National Aeronautic Association
815 15th Street, N.W. Suite 430
Washington, DC 20005

National Aerospace Education Assoc.
Middle Tennessee State Univ.
Box 59
Morfreesboro, TN 37132

National Association of Rocketry
P.O. Box 725
New Providence, NJ 07974

National Geographic Society
17th and M Streets, N.W.
Washington, DC 20036

National Science Foundation
1800 G. St. N.W.
Washington, DC 20550

National Technical Information
Service
5285 Port Royal Road
Springfield, VA 22151

Thomas Nelson Inc.
30 E. 42nd Street
New York, NY 10017

Parks College of Aeronautical Technology
Cahokia, IL 62206

Pergamon Press, Inc.
Maxwell House, Fairview Park
Elmsford, NY 10523

G. P. Putnam's Sons
200 Madison Avenue
New York, NY 10016

Rand Corporation
1700 Main Street
Santa Monica, CA 90406

Rand McNally & Company
P.O. Box 7600
Chicago, IL 60680

Science Service
1719 N. St. N.W.
Washington, DC 20036

Silver Burdett Company
250 James Street
Morristown, NJ 07960

Smithsonian Astrophysical Observatory
60 Garden Street Information Officer
Cambridge, MA 02138

Space Clubs of America
P.O. Box 1822
Newport Beach, CA 92663

Space Publications
1341 G St. N.W.
Washington, DC 20005

Space Science Board
National Academy of Sciences
National Research Council
2101 Constitution Avenue N.W.
Washington, DC 20418

Sterling Publishing Company, Inc.
2 Park Avenue
New York, NY 10016

United Nations
Sales Section
New York, NY 10017

University of New Mexico Press
University of New Mexico
Albuquerque, NM 87131

U.S. Government Printing Office
Superintendent of Documents
Washington, DC 20402

U.S. House of Representatives
Committee on Science and Technology
Room 2321
Rayburn House Office Building
Washington, DC 20515

Franklin Watts, Inc.
730 Fifth Avenue
New York, NY 10019

Webster, Division of McGraw-Hill
Book Company
1221 Avenue of the Americas
New York, NY 10020

Whirlpool Corporation
Administrative Center
Public Relations Department
Benton Harbor, MI 49022

Ziff-Davis Publishing Company
Ziff-Davis Aviation Division
1156 15th St. N.W.
Washington, DC 20005